PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 7 : H04Q 7/38

A1

(11) International Publication Number: **WO 00/56112**

(43) International Publication Date: 21 September 2000 (21.09.00)

(21) International Application Number: PCT/SE00/00330

(22) International Filing Date: 18 February 2000 (18.02.00)

(30) Priority Data:

60/124,918	17 March 1999 (17.03.99)	US
09/442,842	18 November 1999 (18.11.99)	US

(71) Applicant: TELEFONAKTIEBOLAGET LM ERICSSON (publ) [SE/SE]; S–126 25 Stockholm (SE).

(72) Inventors: ROCHEFORT, Steven; 89 Charles, Pointe–Claire, Quebec H9R 4L2 (CA). BLANCO–MATILLA, Oscar; ONA Street, 69, E–28050 Madrid (ES). SULLEIRO–CORPENING, Justo; Lirios, 5, Bajo, E–28016 Madrid (ES). LEFEBVRE, Mylene; 3625 Ridgewood, #406, Montreal, Quebec H3V 1B4 (CA). RICHTER, Harald, Werner; Robensstrasse 40, D–52070 Aachen (DE). BELANGER, Philippe; 990, rue des Tournesols, Laval, Quebec H7Y 2C1 (CA).

(74) Agent: NORIN, Klas; Ericsson Radio Systems AB, Common Patent Department, S–164 80 Stockholm (SE).

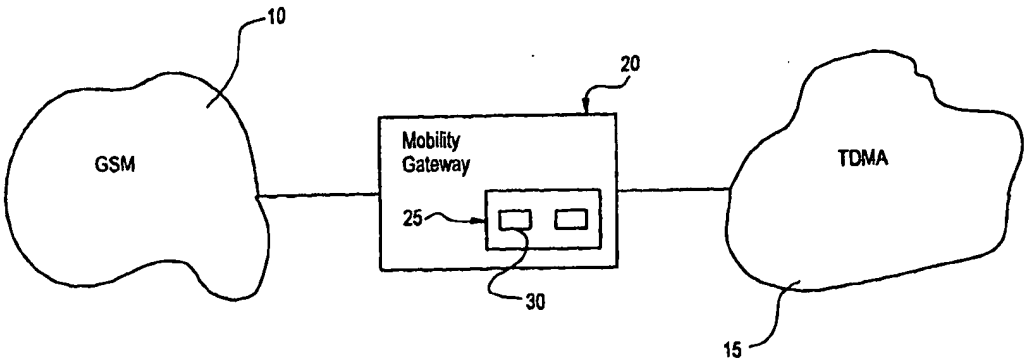
(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published

With international search report.

Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: METHOD AND APPARATUS FOR AUTOMATIC SUBSCRIBER PROFILE GENERATION



(57) Abstract

An apparatus and method enabling automatic profile generation between a first (10) and a second (15) network. Upon request of registration from a visitor location register (42) to a mobility gateway (20) between a first (10) and second (15) network, user profile data from the home (52) location register of the mobile station (38) in the first network (10) is extracted. The extracted user profile data is converted into a form for use within the second (15) network and forwarded to a visitor location (42) within the second network (15).

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	**ES**	Spain	**LS**	Lesotho	**SI**	Slovenia
AM	Armenia	**FI**	Finland	**LT**	Lithuania	**SK**	Slovakia
AT	Austria	**FR**	France	**LU**	Luxembourg	**SN**	Senegal
AU	Australia	**GA**	Gabon	**LV**	Latvia	**SZ**	Swaziland
AZ	Azerbaijan	**GB**	United Kingdom	**MC**	Monaco	**TD**	Chad
BA	Bosnia and Herzegovina	**GE**	Georgia	**MD**	Republic of Moldova	**TG**	Togo
BB	Barbados	**GH**	Ghana	**MG**	Madagascar	**TJ**	Tajikistan
BE	Belgium	**GN**	Guinea	**MK**	The former Yugoslav Republic of Macedonia	**TM**	Turkmenistan
BF	Burkina Faso	**GR**	Greece			**TR**	Turkey
BG	Bulgaria	**HU**	Hungary	**ML**	Mali	**TT**	Trinidad and Tobago
BJ	Benin	**IE**	Ireland	**MN**	Mongolia	**UA**	Ukraine
BR	Brazil	**IL**	Israel	**MR**	Mauritania	**UG**	Uganda
BY	Belarus	**IS**	Iceland	**MW**	Malawi	**US**	United States of America
CA	Canada	**IT**	Italy	**MX**	Mexico	**UZ**	Uzbekistan
CF	Central African Republic	**JP**	Japan	**NE**	Niger	**VN**	Viet Nam
CG	Congo	**KE**	Kenya	**NL**	Netherlands	**YU**	Yugoslavia
CH	Switzerland	**KG**	Kyrgyzstan	**NO**	Norway	**ZW**	Zimbabwe
CI	Côte d'Ivoire	**KP**	Democratic People's Republic of Korea	**NZ**	New Zealand		
CM	Cameroon			**PL**	Poland		
CN	China	**KR**	Republic of Korea	**PT**	Portugal		
CU	Cuba	**KZ**	Kazakstan	**RO**	Romania		
CZ	Czech Republic	**LC**	Saint Lucia	**RU**	Russian Federation		
DE	Germany	**LI**	Liechtenstein	**SD**	Sudan		
DK	Denmark	**LK**	Sri Lanka	**SE**	Sweden		
EE	Estonia	**LR**	Liberia	**SG**	Singapore		

METHOD AND APPARATUS FOR AUTOMATIC SUBSCRIBER PROFILE GENERATION

RELATED APPLICATIONS

This application claims priority from and incorporates herein by reference the entire disclosure of U.S. Patent Serial No. 60/124,918, filed March 17, 1999.

BACKGROUND OF THE INVENTION

Technical Field of the Invention

The present invention relates in general to the generation and maintenance of subscriber profiles, and more particularly, to the dynamic generation and maintenance of subscriber profiles between two separate networks having differing technologies.

Description of Related Art

Within cellular networks, a mobile subscriber may roam between service areas of different networks. Various techniques have been developed to enable a mobile subscriber to continue being provided with mobile telephone services once they have left their home service area. In a first alternative, once a mobile subscriber travels into a new mobile switching center (MSC) coverage area and turns on their mobile station for the first time, the mobile station attempts to register with the servicing MSC for the area by transmitting an associated identification number known as the international mobile subscriber identity (IMSI) number or mobile identification number (MIN). The serving MSC communicates with the home location register associated with the mobile station using the received IMSI/MIN. This communication is to inform the HLR of the mobile station's new location and to receive requisite subscriber information from the HLR necessary to provide mobile services to the newly registering mobile station.

However, when mobile subscribers move between networks utilizing different technologies, for example, a GSM system utilizing a GSM MAP protocol and a TDMA system using a ANSI-41 protocol, the various information required to be

transmitted between the networks creates problems in converting information between the protocols useable by each system.

One of the problems involves the use of user profiles between networks utilizing different technologies. Current implementations of inter-technology roaming require that dual profiles for mobile subscribers be provisioned. One profile resides within the HLR of the user's home network and another profile resides within the roaming gateway (typically an Interworking Location Register (ILR)) of the network in which the mobile subscriber is presently located. The dual profiles contain information on subscriber services such as call waiting, call forwarding, etc. The use of dual profiles creates a provisioning problem for system operators who must define two sets of user profiles and insure that the profiles are consistent, i.e., contain the same information. Provisioning of a profile calls for a system operator to define the services and capabilities available to a subscriber in the HLR. It also describes the configuration of network entity information necessary to operate the HLR/MSC. Thus, some method for providing for dynamic profile creation and management for a user profile in an HLR of a roaming subscriber would greatly assist in the operation of inter-technology roaming.

SUMMARY OF THE INVENTION

The present invention overcomes the foregoing and other problems with a method and apparatus for automatic profile generation between a first network and a second network. A mobility gateway enables the creation of user profile data between a first network, such as a TDMA network, and a second network, such as a GSM network. When a mobile station of the first network is roaming within the second network, the mobile station initially requests registration of the mobile station to the visitor location register presently serving the mobile station. The request is forwarded to a mobility gateway between the first and second networks. In response to the request, user profile data is extracted from the home location register of the mobile station within the first network. The extracted information is converted into a form useable within the second network, and the newly created user profile is forwarded to

the visitor location register of the second network which is presently serving the mobile station.

Once a user profile has been created within the second network for the mobile station, the user profile may be periodically updated in response to generation of a profile update in the first network. This process involves the transmission of an update request message to the mobility gateway and the conversion of the message to a second message for use in the second network. The second message is transmitted to the visitor location register containing the second user profile wherein the profile is updated in response to the message. A response is provided back to the home location register in the first network notifying of completion of the update.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the present invention, reference is made to the following Detailed Description taken in conjunction with the accompanying drawings wherein:

FIGURE 1 is a functional block diagram illustrating a mobility gateway including the functionality of the present invention between a GSM network and a TDMA network;

FIGURE 2 is a table for mapping of a user profile from TDMA to GSM;

FIGURE 3 is a table for mapping of a user profile from GSM to TDMA;

FIGURE 4 is a signaling diagram illustrating the manner in which a GSM mobile subscriber in a TDMA network generates a user profile using the mobility gateway;

FIGURE 5 is a signaling diagram illustrating a user profile update for a GSM mobile subscriber in a TDMA network;

FIGURE 6 is a signaling diagram illustrating the generation of a user profile using a mobility gateway for a TDMA subscriber in a GSM network; and

FIGURE 7 is a signaling diagram illustrating a user profile update for a TDMA subscriber in a GSM network.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to the Drawings, and more particularly to FIGURE 1, there is illustrated a block diagram of a GSM network 10 utilizing a GSM MAP protocol interconnected with a TDMA network 15 using a ANSI-41 protocol through a mobility gateway 20. The GSM network 10 enables subscribers to access telecommunications functionalities utilizing GSM technologies. The TDMA network enables mobile subscribers to access telecommunications functionalities using TDMA technologies.

The mobility gateway 20 enables mobile subscribers from the GSM network 20 to roam within the TDMA network 15 and mobile subscribers from the TDMA network to roam within the GSM network 10 while maintaining access to substantially all of the services and functionalities provided to them within their home network. While the present system is described with respect to interconnections between a TDMA system using the ANSI-41 protocol and a GSM system utilizing a GSM MAP protocol, it should be realized that the mobility gateway 20 and discussions with respect thereto may be extended to include other mobile protocols and networks (such as CDMA systems) such that the described system is not limited to use between GSM and TDMA networks.

As mentioned previously, one problem involved in roaming between GSM and TDMA networks is the necessity to provision and maintain two separated user profiles for mobile subscribers roaming between the networks by the system operator. The mobility gateway 20 of the present invention includes an automatic subscriber profile generator functionality 25 that enables dynamic creation of user profiles utilizable by the network into which a mobile subscriber has presently roamed. The automatic profile generation functionality 25 uses a rule based system to map the user services within a profile between standards, to the most appropriate implementation for the system where the subscriber has roamed.

The rules based system may be implemented by a set of tables 30 as more fully illustrated in FIGURES 2 and 3. FIGURE 2 illustrates a table for mapping from a TDMA system to a GSM system. A particular service described within a user profile in a TDMA system is found in the TDMA portion 31 of the table 30 and the corresponding GSM service is output from the table for use in the profile reflecting the

user services within the GSM system. Likewise, as shown in FIGURE 3, services within a user profile of a GSM system may be found in the GSM portion 32 of a table 30 so that the service may be mapped to the corresponding TDMA equivalent within a TDMA system. In this way, services described within a user profile may be easily mapped from one system to the other by the user profile functionality 25 of the mobility gateway 20.

Referring now to FIGURE 4, there is illustrated a signaling diagram describing registration of a GSM subscriber in a TDMA network wherein a user profile does not presently exist for the roaming GSM subscriber within the TDMA network. A mobile station 38 initially makes a registration access wherein the mobile station attempts to register with the TDMA network by transmitting a registration access message 40 to a TDMA MSC/VLR 42 (the MSC and VLR may be either co-located or separate). In response to the registration access message 40, the TDMA MSC/VLR 42 transmits a registration notification message 45 to the mobility gateway 20 to request what it believes to be the subscriber's TDMA profile. This triggers generation of a user profile for the mobile station subscriber within the TDMA network.

In response to the registration notification message 45, the mobility gateway 20 transmits a location update message 50 to the GSM HLR 52 of the subscriber mobile station 38, since mobile station information is TDMA in nature, and points to the gateway as a pseudo TDMA HLR. From the view of the GSM HLR 52 the location update message 50 comes from a GSM VLR which the mobility gateway 20 mimics. The GSM HLR 52 next transmits one or more insert subscriber data messages 55 back to the mobility gateway 20. The insert subscriber data messages 55 contain subscriber profile data for insertion within the subscriber profile being created within the mobility gateway 20 and enables the mobility gateway to extract the necessary data for the profile. Once received, the subscriber information is converted for insertion into a user profile of a TDMA network using the mapping tables 35 described previously with respect to FIGURE 1.

After receipt of an insert subscriber data message 55 by the mobility gateway 20, an insert subscriber data result message 60 is transmitted back to the GSM HLR 52 to notify the HLR that the transmitted data has been successfully received. After

all subscriber profile data has been transmitted to the mobility gateway 20, a location update result message 70 is transmitted to the mobility gateway to notify of completion of transmission of the subscriber profile data, and a registration notification return result message 75 is transmitted to the MSC/ VLR 42. The registration notification return result message 75 contains all of the subscriber profile information required by the MSC/VLR for the mobile station 38 to operate within a TDMA network. From the view of the TDMA MSC/VLR 42, the subscriber data information is being provided by a TDMA HLR (which the mobility gateway 20 mimics) storing the subscriber profile data for the subscriber mobile station 38. Finally, the mobile station 38 is transmitted a registration accepted message 80 to notify the mobile station that it has now successfully registered with the TDMA network. The derived profile is maintained in the gateway without the need for subsequent requests to the subscriber's HLR, until the subscriber returns to the home network.

Referring now to FIGURE 5, there are illustrated the messages necessary for an update of a user profile previously created for a GSM subscriber mobile station 38 roaming within a TDMA network 15. Upon receipt of a profile update message 85, from either a GSM network operator or a subscriber, by the GSM HLR 52, the GSM HLR 52 transmits an insert/delete subscriber data message 90 to the mobility gateway 20. The mobility gateway 20 converts the requested profile change into a profile change for a TDMA system using the mapping tables 30 discussed previously.

A qualification directive message 95 is transmitted to the TDMA MSC/VLR 42 presently serving the subscriber mobile station 38 associated with the profile to be changed. The TDMA MSC/VLR 42 updates at 100 the user profile associated with the subscriber mobile station 38. After the profile update is performed, a qualification return result message 105 is transmitted back to the mobility gateway 20 to provide notification that the user profile has been properly updated. The mobility gateway 20 notifies the HLR 52 of the completed update using a insert/delete subscriber data result message 110.

Referring now to FIGURE 6, where there is shown a signaling diagram of a TDMA subscriber registering within a GSM network when a user profile is not presently created within the GSM network for the TDMA subscriber. The subscriber

mobile station 28 transmits a location update request message 115 to the GSM MSC/VLR 120 (the MSC and VLR may be either co-located or separate) presently serving the subscriber mobile station. The GSM MSC/VLR 120 transmits a location update message 125 to the mobility gateway 20 in order to initiate creation of a subscriber profile. The mobility gateway 20 generates a registration notification message 130 to the subscriber mobile station's TDMA HLR 135. From the HLR's 38 point of view the request is coming from a TDMA VLR. The TDMA HLR 135 obtains the user profile information for the subscriber mobile station 38 and transmits this information back to the mobility gateway 20 within a registration notification return result message 140.

Once the necessary profile information has been received by the mobility gateway 20 from the TDMA HLR 135, the mobility gateway generates a subscriber mobile station profile for the GSM network using the profile generation functionality 25. Once the profile has been generated, the mobility gateway 20 transmits insert subscriber data messages 145 to the serving GSM MSC/VLR 120 to download the generated subscriber profile data to the VLR. Once the subscriber profile has been completely received by the GSM MSC/VLR 120, an insert subscriber data result message 150 is transmitted to the mobility gateway 20 from the GSM MSC/VLR 120. After the profile information has been transmitted to the serving GSM MSC/VLR 120, an update location result message 155 is transmitted back to the GSM MSC/VLR 120. Finally, the GSM MSC/VLR 120 notifies the subscriber mobile station 38 of the completed registration using a location update accept message 160. The derived profile is maintained in the gateway without the need for subsequent requests to the subscriber's HLR, until the subscriber returns to the home network.

Referring now to FIGURE 7, there is illustrated the manner for updating a user profile for a presently registered TDMA subscriber mobile station 38 within a GSM network. The process is initiated by a profile change 165 initiated by either the TDMA network operator or the subscriber. In response to the profile change, the TDMA HLR 135 transmit a qualification directive message 170 to the mobility gateway 20 indicating the changes to be made to the user profile. The profile changes are

converted by the profile generation functionality 25 to a form useable by the GSM network.

An insert/delete subscriber data message 175 is transmitted from the mobility gateway 20 to the GSM MSC/VLR 120 presently serving the subscriber mobile station 38. The insert/delete subscriber data message 175 includes the profile change information. The GSM MSC/VLR 120 responds by updating the profile within the MSC/VLR with the information contained within the insert/delete subscriber data message 175 at 178. An insert/delete subscriber data result message 180 is transmitted back to the mobility gateway 20 indicating that the necessary changes have been made. The GSM MSC/VLR 120 views the mobility gateway as the home location register of the subscriber mobile station 38. At the same time, the mobility gateway 20 acts as a VLR with respect to the TDMA HLR 135. A qualification directive return result message 185 is transmitted to the TDMA HLR 135 from the mobility gateway 20 to indicate that the profile update has been completed.

The mobility gateway 20 enables user profile data to be extracted from the HLR of the home network of the subscriber mobile station such that the data may then be mapped into the proper protocol for the network where the subscriber mobile station is roaming. The mobility gateway acts as an HLR to the network into which the subscriber mobile station has roamed and acts as a VLR with respect to the HLR of the home network of the subscriber mobile station. This situation is the same whether a TDMA subscriber has roamed into a GSM network or a GSM subscriber has roamed into a TDMA network.

Although a preferred embodiment of the method and apparatus of the present invention has been illustrated in the accompanying Drawings and described in the foregoing Detailed Description, it is understood that the invention is not limited to the embodiment disclosed, but is capable of numerous rearrangements, modifications, and substitutions without departing from the spirit of the invention as set forth and defined by the following claims.

WHAT IS CLAIMED IS:

1. An apparatus for automatic profile generation between a first network and a second network comprising:

a first input for receiving user profile data from a home location register within the first network;

a module for generating user profile data for use in the second network by converting user profile data from the home location register in a first form in the first network to a second form for use in a visitor location register of the second network; and

a first output for transmitting the generated user profile data to the visitor location register in the second network.

2. The apparatus of Claim 1, wherein the module further includes:

a first table for converting the user profile data from the first form to the second form; and

a second table for converting the user profile data from the second form to the first form.

3. The apparatus of Claim 1, wherein the first network comprises a TDMA network and the second network comprises a GSM network.

4. The apparatus of Claim 1, wherein the first network comprises a GSM network and the second network comprises a TDMA network.

5. The apparatus of Claim 1, wherein the first network comprises a GSM network and the second network comprises a CDMA network.

6. The apparatus of Claim 1, wherein the first network comprises a TDMA network and the second network comprises a CDMA network.

7. A method for automatically generating a user profile between a first network and a second network, comprising the steps of:

requesting registration of a mobile station from a visitor location register to a mobility gateway between the first network and the second network;

extracting user profile data from a home location register of the mobile station in the first network using the mobility gateway between the first network and the second network;

converting the user profile data from the first network into user profile data useable by the second network; and

forwarding the converted user profile data to the visitor location register of the second network.

8. The method of Claim 7, wherein the mobility gateway functions as a home locator register with respect to the second network.

9. The method of Claim 8, wherein the mobility gateway functions as a visitor location register with respect to the first network.

10. The method of Claim 7, wherein the first network comprises a TDMA network and the second network comprises a GSM network.

11. The method of Claim 7, wherein the first network comprises a GSM network and the second network comprises a TDMA network.

12. The method of Claim 7, wherein the step of requesting further comprises the steps of:

transmitting a registration access message from the mobile station of the visitor location register; and

transmitting a registration notification message to the mobility gateway from the visitor location register.

13. The method of Claim 7, wherein the step of extracting further comprises the steps of:

requesting the user profile data by a location update message transmitted from the mobility gateway to the home location register in the second network; and

forwarding the user profile data from the home location register in the second network to the mobility gateway via subscriber data messages.

14. The method of Claim 7, wherein the step of converting further comprises the step of accessing a conversion table within the mobility gateway to convert the user profile data of the first network to user profile data useable by the second network.

15. The method of Claim 7 further including the step of updating the user profile data in the visitor location data of the second network in response to generation of a profile update.

16. The method of Claim 15, wherein the steps of updating further comprises the steps of:

transmitting a message requesting update of the user profile data from the HLR of the first network to the mobility gateway;

converting the message to a second message for use in the second network;

transmitting the second message requesting update of the user profile data from the mobility gateway to the visitor location register of the second network;

updating the user profile data and the visitor location data of the second network; and

notifying the home location register in the first network of the update.

17. The method of Claim 16, wherein the first network comprises a GSM network and the second network comprises a CDMA network.

18. The method of Claim 16, wherein the first network comprises a TDMA network and the second network comprises a CDMA network.

19. A method for maintaining a user profile between a first network and a second network, comprising the steps of:

generating a second user profile in a second network from a first user profile in a first network using a mobility gateway separating the first network and the second network; and

updating the second user profile in the second network in response to generation of a profile update to the first user profile in the first network.

20. The method of Claim 19, wherein the steps of updating further comprises the steps of:

transmitting a message requesting update of the user profile data from the HLR of the first network to the mobility gateway;

converting the message to a second message for use in the second network;

transmitting the second message requesting update of the user profile data from the mobility gateway to the visitor location register of the second network;

updating the user profile data and the visitor location data of the second network; and

notifying the home location register in the first network of the update.

21. The method of Claim 19, wherein the first network comprises a TDMA network and the second network comprises a GSM network.

22. The method of Claim 19, wherein the first network comprises a GSM network and the second network comprises a TDMA network.

23. The method of Claim 19, wherein the step of generating further comprises the steps of:

requesting registration of a mobile station from a visitor location register to a mobility gateway between the first network and the second network;

extracting user profile date from a home location register of the mobile station in the first network using the mobility gateway between the first network and the second network;

converting the user profile data from the first network into user profile data useable by the second network; and

forwarding the converted user profile data to the visitor location register of the second network.

24. The method of Claim 23, wherein the step of extracting further comprises the steps of:

requesting the user profile data by a location update message transmitted from the mobility gateway to the home location register in the second network; and

forwarding the user profile data from the home location register in the second network to the mobility gateway via insert subscriber data messages.

25. The method of Claim 23, wherein the step of converting further comprises the step of accessing a conversion table within the mobility gateway to convert the user profile data of the first network to user profile data useable by the second network.

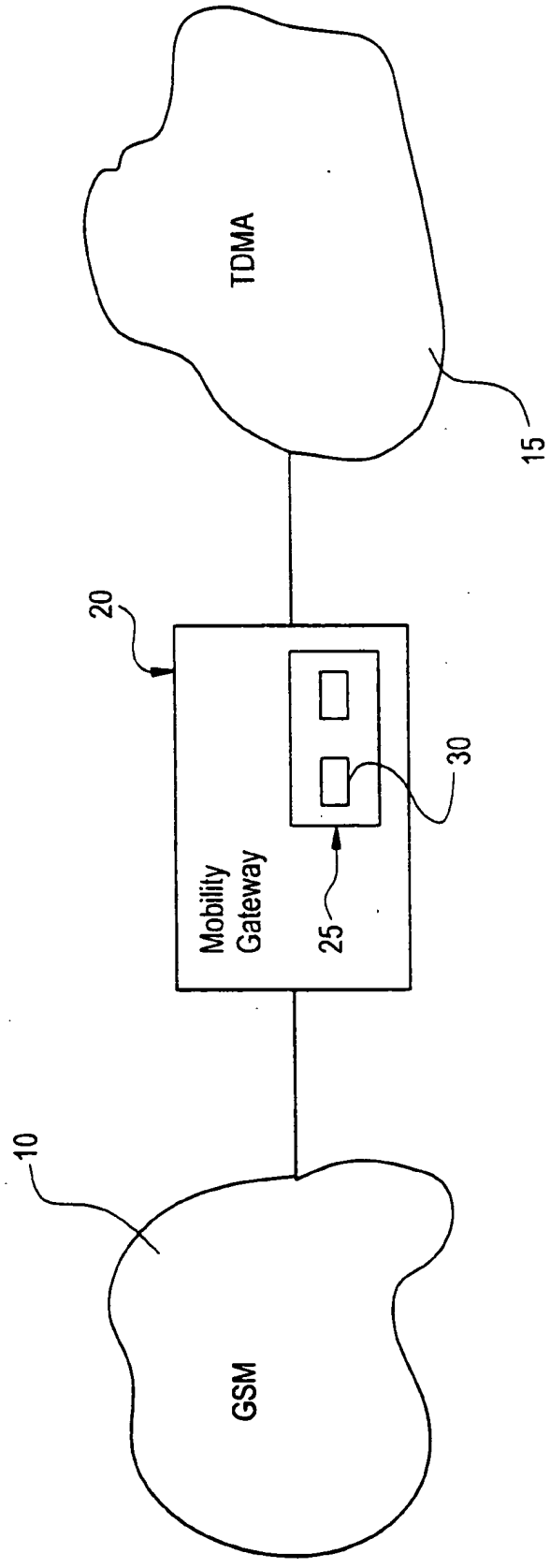


FIG.1

FIG. 2A

TDMA				GSM			
Comments	Description	Service	Value	Service	Value	Description	Comments
Not authorized	Asynchronous data service	No service		No service		Asynchronous Data 9600 Kbps	Service not provided
Authorized		ADS	Inact.	No service			Service not provided
Authorized and active		ADS	Act.	BS26	Avail.		Service provided
Service not provided	Originating Restrictions	No service		No service		Operator determined barring of outgoing calls	ODB of all outgoing calls
Prior agreement		OR	1	OBO	1		ODB of all outgoing calls
Origination denied		OR	2	OBO	1		ODB of all outgoing calls
Local calls only		OR	3	OBO	2		ODB of all outgoing international calls
Selected leading digits of directory number		OR	4	OBO	2		ODB of all outgoing international calls
Selected leading digits of directory number and local calls only		OR	5	OBO	2		ODB of all outgoing international calls
National Long Distance		OR	6	OBO	2		ODB of all outgoing international calls
International calls		OR	7	No service			Service not provided
Single directory number		OR	8	OBO	1		ODB of all outgoing calls

31

32

30

FIG. 2B

Service not provided	Call Waiting	No service		No service		Call Waiting	Service not provided
Service provided		CAW	Inact.	CAW	Inact.		Service provided
Service provided and active		CAW	Act.	CAW	Act.		Service provided and active
Service not provided	Enquiry	No service		No service		Call hold	Service not provided
Hold for enquiry		ENQ	1	HOLD	Act.		Service provided and active
Hold for enquiry with three way conversation service		ENQ	2	HOLD	Act.		Service provided and active
Hold for enquiry with transfer service		ENQ	3	HOLD	Act.		Service provided and active
Subscriber with full three party service		ENQ	4	HOLD	Act.		Service provided and active
Service not provided	Enquiry	No service		No service		Multiparty	Service not provided
Hold for enquiry		ENQ	1	No service			Service not provided
Hold for enquiry with three way conversation service		ENQ	2	MPTY	Act.		Service provided and active
Hold for enquiry with transfer service		ENQ	3	No service			Service not provided
Subscriber with full three party service		ENQ	4	MPTY	Act.		Service provided and active
Service not provided	Transfer on Busy Variable service	No service		No service		Call forwarding on busy	Service not provided
Service provided		TBV	Inact.	CFB	Inact.		Service inactive
Service provided and active		TBV	Act.	CFB	Act.		Service provided and active

FIG. 2C

Service not provided	Transfer on No reply Variable service	No service		No service		Call forwarding on no reply	Service not provided
Service provided		TNV	Inact.	CFNRY	Inact.		Service inactive
Service provided and active		TNV	Act.	CFNRY	Act.		Service provided and active
Service not provided	Transfer on No reply Variable service	No service		No service		Call forwarding on not reachable	Service not provided
Service provided		TNV	Inact.	CFNRC	Inact.		Service inactive
Service provided and active		TNV	Act.	CFNRC	Act.		Service provided and active
Type of subscriber		TCL A <=> CAT B Mapping to be defined by operator				Subscriber category	
Service not provided	A-number Transfer	No service		No service		Calling line identification presentation	Service not provided
Authorized		CNIP	Inact.	No service			Service not provided
Authorized and active		CNIP	Act.	CLIP	1		Service provided without override category
Service not provided	A-number Presentation Restriction	No service		No service		Calling line identification restriction	Service not provided
Authorized		CNIR	Inact	No service			Service not provided
Authorized and active		CNIR	Act.	CLIR	1		Service provided

FIG. 2D

Service not provided	A-number Presentation Override	No service		No service		Calling line identification presentation	Service not provided
Authorized		CNIROR	Inact.	No Service			Service not provided
Authorized and active		CNIROR	Act.	CLIP	2		Service provided with over-ride category
Service not provided	Preferred Interexchange Carrier	No service		No service		Primary inter-exchange carrier identifier	Service not provided
Service provided		CIC	1-9999	PIC	1-9999		Service provided
Service not provided	SMS Termination Restrictions	No service		No service		Short Message MT/PP	Service not provided
Allow specific		SMSORD	1	TS21	Avail.		Service not provided
Allow all		SMSORD	2	No service			Service provided
Service not provided	SMS Origination Restrictions	No service		No service		Short Message MO/PP	Service not provided
Allow specific		SMSORD	1	TS22	Avail.		Service not provided
Allow all		SMSORD	2	No service			Service provided
Not authorized	Group 3 Fax	No service		No service		Automatic facsimile group 3	Service not provided
Authorized		G3FAX	Inact.	No service			Service not provided
Authorized and active		G3FAX	Act.	TS62	Avail.		Service provided
Abbreviations: Inact. = Inactive Act. = Active Avail. = Available							

7/6/05, EAST Version: 2.0.1.4

FIG. 3A

32

31

GSM				TDMA			
Comments	Description	Service	Value	Service	Value	Description	Comments
Service not provided	Operator determined barring of outgoing calls	No service		OR	7	Operating Restrictions	International calls
ODB of all outgoing calls		OBO	1	OR	2		Origination denied
ODB of all outgoing international calls		OBO	2	OR	6		Local calls only
ODB of all outgoing international calls except those directed to home PLMN country		OBO	3	OR	6		Selected leading digits of directory number and local calls only
Service not provided	Call Waiting	No service		No service		Call Waiting	Service not provided
Service provided		CAW	Inact.	CAW	Inact.		Service provided
Service provided and active		CAW	Act.	CAW	Act.		Service provided and active
Service not provided	Barring of all outgoing calls	No service		No service		Subscriber controlled code controlled barring	Service not provided
Service provided		BAOC	Inact.	CCOR	Inact. 2		Service inactive
Service provided and active		BAOC	Act.	CCOR	Act. 2		Origination denied
Service not provided	Barring of all outgoing int. calls	No service		No service		Subscriber controlled code controlled barring	Service not provided
Service provided		BOIC	Inact.	CCOR	Inact. 6		Service inactive
Service provided and active		BOIC	Act.	CCOR	Act. 6		National Long Distance

7/6/05, EAST Version: 2.0.1.4

FIG. 3B

Service not provided	Barring of all outgoing int.calls except those directed to the HPLMN	No service		No service		Subscriber controlled code controlled barring	Service not provided
Service provided		BOIEXH	Inact.	CCOR	Inact. 6		Service inactive
Service provided and active		BOIEXH	Act.	CCOR	Act. 6		National Long Distance
Service not provided	Call hold	No service		No service		Enquiry	Subscriber not authorized to the service
Service provided		HOLD	Inact.	No service			Subscriber not authorized to the service
Service provided and active		HOLD	Act.	ENQ	1		Access to enquiry service
Service not provided	Multiparty	No service		No service		Enquiry	Subscriber not authorized to the service
Service provided		MPTY	Inact.	No service			Subscriber not authorized to the service
Service provided and active		MPTY	Act.	ENQ	2		Subscriber with full 3-party service
Service not provided	Call forwarding on busy	No service		No service		Transfer on Busy Variable service	Service not provided
Service provided		CFB	Inact.	TBV	Inact.		Service inactive
Service provided and active		CFB	Act.	TBV	Act.		Service provided
Service not provided	Call forwarding on no reply	No service		No service		Transfer on No reply Variable service	Service not provided
Service provided		CFNRY	Inact.	TNV	Inact.		Service inactive
Service provided and active		CFNRY	Act.	TNV	Act.		Service provided

7/6/05, EAST Version: 2.0.1.4

FIG. 3C

Service not provided	Call forwarding on not reachable	No service		No service		Transfer on No reply Variable service	Service not provided
Service provided		CFNRC	Inact.	TNV	Inact.		Service inactive
Service provided and active		CFNRC	Act.	TNV	Act.		Service provided
Subscriber category		CAT A <=> TCL B Mapping to be defined by operator				Type of subscriber	
Service not provided	Calling line identification presentation	No service		No service		A-Number Transfer	Service not provided
Service provided without override category		CLIP	1	CNIP	Act.		Service provided and active
Service provided with override category		CLIP	2	CNIROR	Act.		Service provided and active
Service not provided	Calling line identification restriction	No service		No service		A-number Presentation Barring	Service not provided
Permanent mode		CLIR	1	CNIR	Act.		Service provided and active
Temporary mode, presentation restricted		CLIR	2	CNIR	Act.		Service provided and active
Temporary mode, presentation allowed		CLIR	3	CNIR	Act.		Service provided and active

7/6/05, EAST Version: 2.0.1.4

7/6/05, EAST Version: 2.0.1.4

FIG. 3D

Service not provided	Primary inter-exchange carrier identifier	No service		No service		Preferred Interexchange Carrier	Service not provided
Service provided		PICI	1-9999	CIC	1-9999		Service provided
Service not provided	Short Message MT/PP	No service		No service		SMS Termination Restrictions	Service not provided
Service provided		TS21	Avail.	SMSTRD	1		Allow all.
Service not provided	Short Message MO/PP	No service		No service		SMS Origination Restrictions	Service not provided
Service provided		TS22	Avail.	SMSORD	1		Allow all.
Service not provided	Automatic facsimile group 3	No service		No service		Group 3 Fax	Service not provided
Service provided		TS62	Avail.	G3FAX	Act.		Authorized and active
Service not provided	Asynchronous Data 9600 Kbps	No service		No service		Asynchronous data service	Service not provided
Service provided		BS26	Avail.	ADS	Act.		Authorized and active
Abbreviations: Inact. = Inactive Act. = Active Avail. = Available							

30

FIG.4

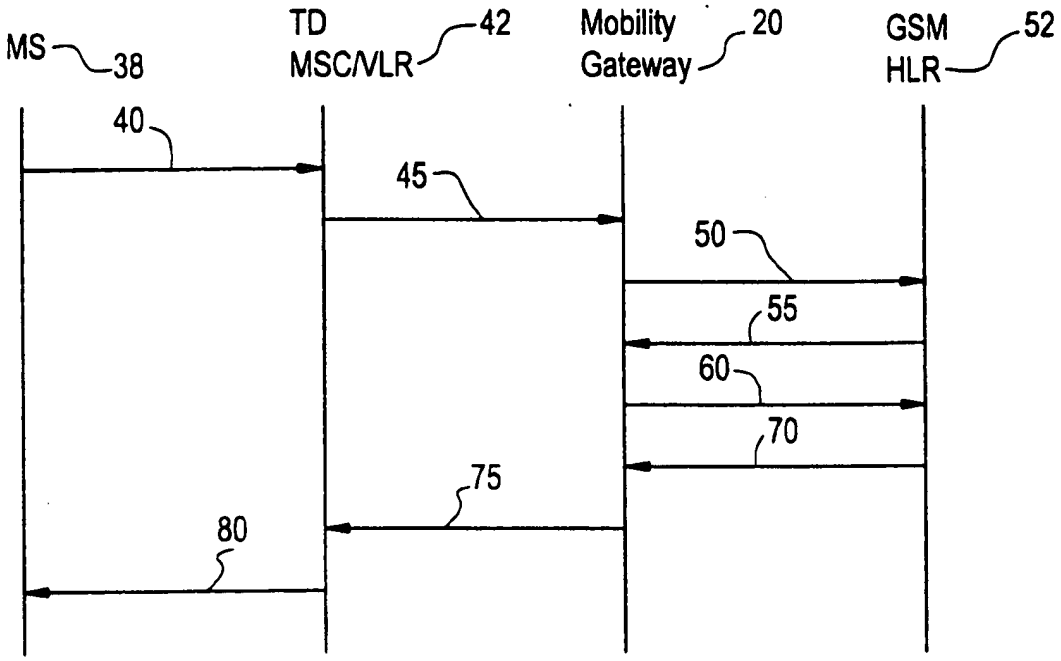

MS
38
TD
MSC/VLR
42
Mobility
Gateway
20
GSM
HLR
52
40
45
50
55
60
70
75
80

Fig.5

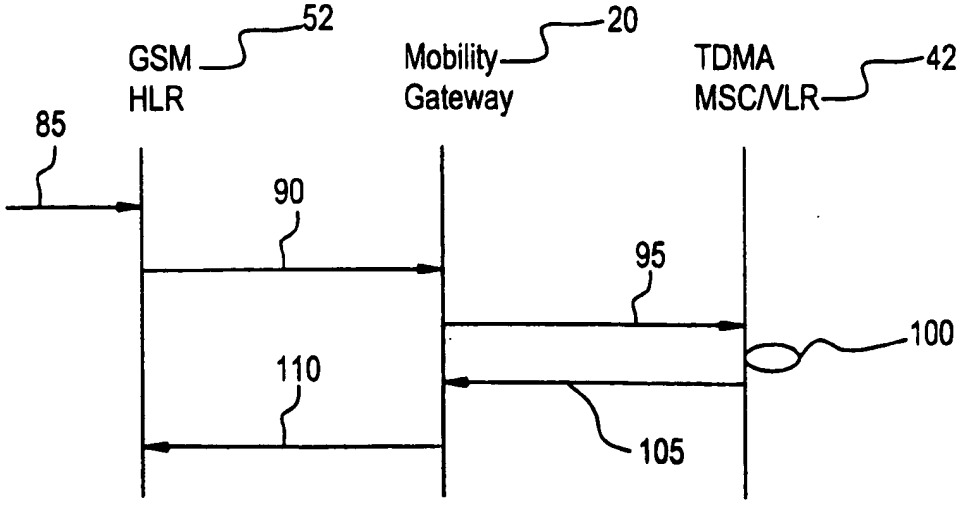

GSM
HLR
52
Mobility
Gateway
20
TDMA
MSC/VLR
42
85
90
95
100
110
105

FIG.6

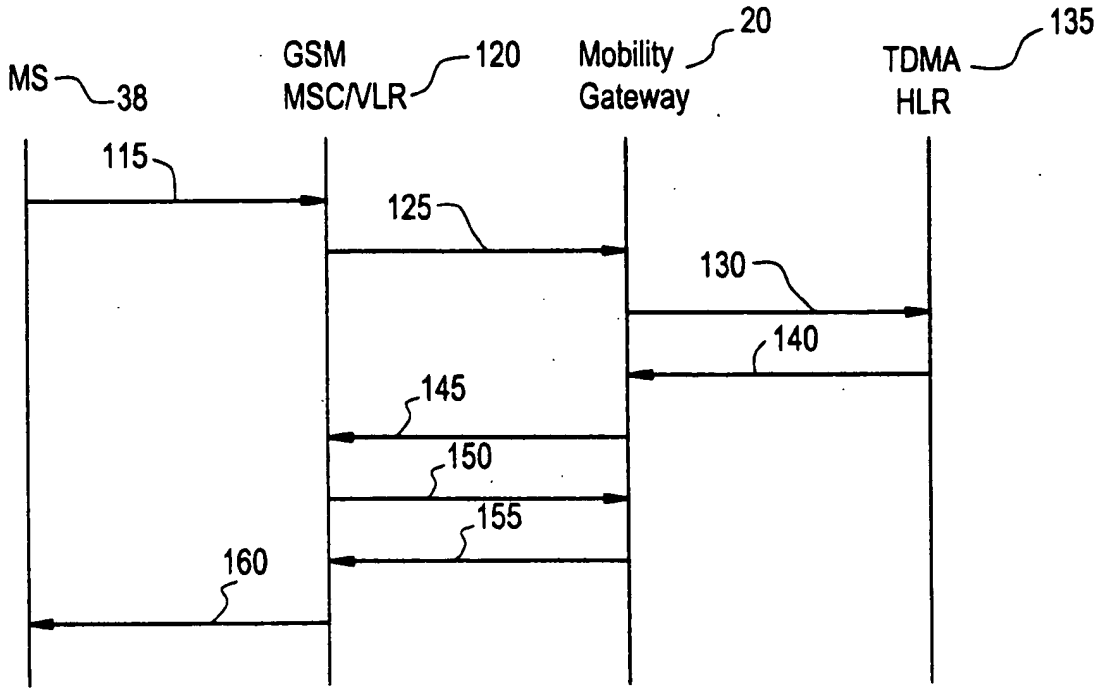
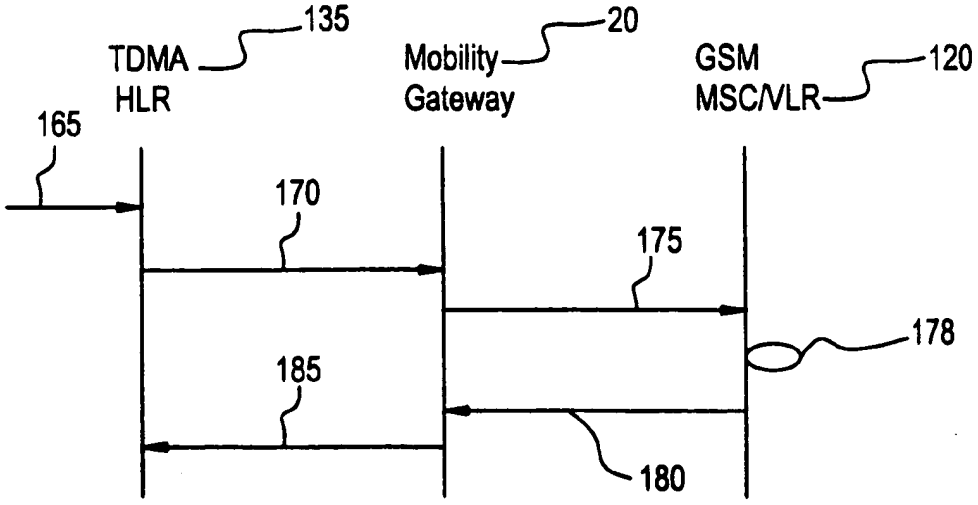

MS
38
GSM
MSC/VLR
120
Mobility
Gateway
20
TDMA
HLR
135
115
125
130
140
145
150
155
160

Fig.7


TDMA
HLR
135
Mobility
Gateway
20
GSM
MSC/VLR
120
165
170
175
178
185
180

INTERNATIONAL SEARCH REPORT

Inte. ..donal Application No
PCT/SE 00/00330

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04Q7/38

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	WO 98 37724 A (ERICSSON TELEFON AB L M) 27 August 1998 (1998-08-27) page 3, line 8 -page 4, line 3 page 5, line 4 - line 22 page 7, line 29 -page 8, line 29 page 9, line 15 -page 10, line 9 page 11, line 29 -page 12, line 21	1,3-13 15-24
Y	YU J I: "IS-41 FOR MOBILITY MANAGEMENT" INTERNATIONAL CONFERENCE ON UNIVERSAL PERSONAL COMMUNICATIONS,US,IEEE, NEW YORK, NY, 1992, pages 158-162, XP000494916 the whole document	15-24
X	GB 2 304 497 A (NORTHERN TELECOM LTD) 19 March 1997 (1997-03-19) page 8 -page 15	1

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
14 July 2000	20/07/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Coppieters, S

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/SE 00/00330

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9837724 A	27-08-1998	US 5901352 A	04-05-1999
		AU 6127098 A	09-09-1998
GB 2304497 A	19-03-1997	EP 0845193 A	03-06-1998
		WO 9707641 A	27-02-1997
		US 6032044 A	29-02-2000

7/6/05, EAST Version: 2.0.1.4